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Simulating systems of itinerant spin-carrying particles using arrays of superconducting qubits and resonators SAHEL ASHHAB, Qatar Energy and Environment Research Institute (QEERI), Qatar Foundation, Doha, Qatar — We propose potential setups for the quantum simulation of itinerant spin-carrying particles in a superconducting qubit-resonator array. These proposals include the use of multiple polariton branches, multiple resonator modes and multiple qubits coupled to each resonator. We argue that a combination of using multiple qubits and multiple resonator modes is a promising route in this context, allowing the simulation of external magnetic fields and various forms of spin-dependent inter-site hopping, including spin-orbit coupling. This proposal could be implemented in state-of-the-art superconducting circuits in the near future.

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